

REMARKS

Status of the Claims:

Claims 16 -20 are pending.

Claims 1-16 were previously cancelled.

Claims 16- 20 were rejected.

Claim 16 has been **amended** by this response.

Claims 21, 22 have been **added** by this response.

The Examiner rejected claim 16-19 under 35USC102 as being anticipated by Tuttle [U.S. Patent #6,413,788].

Specifically, the Examiner Stated:

“Tuttle discloses a method of forming a shared global work line MRAM structure, comprising: etching a trench 38 in an oxide layer 36 formed over a substrate (col. 5, lines 14-16); depositing a first liner material 52 (col. 6, lines 63-66 and fig. 5A); anisotropically etching (Noting that Applicant Specification page 16, lines 18-20 teaches anisotropic etching by reactive ion etching or ion milling) the deposited first liner material 52 (col. 7, lines 26-31) leaving the first liner material 52 on edges of the trench 38 (col. 7, lines 32-34 and fig. 5B); depositing a magnetic metal liner material 54 (col. 6, line 63 through col. 7, line 1); anistropically etching the deposited magnetic metal liner material 54 (col. 7, lines 26-31) leaving the magnetic metal liner material 54 over the first liner material 52 on edges of trench 38 (col. 7, lines 32-34 and fig. 5B); depositing a conductive layer 74 (col. 7, lines 45-46 and fig. 5C); and chemically, mechanically polishing the conductive layer 74 (col., lines 47-54 and fig. 5D).

Amended claim 1 includes the following features:

etching a trench in an oxide layer formed over a substrate;
depositing an first liner material;
anisotropically etching the deposited first liner material leaving the first liner material on edges of the trench, and physically contacting a bottom of the trench;
depositing an magnetic metal liner material;
anisotropically etching the deposited magnetic metal liner material leaving the magnetic metal liner material over the first liner material on edges of the trench, so that the magnetic metal liner extends to and physically contacts the bottom of the trench;
depositing a conductive layer; and
chemically, mechanically polishing the conductive layer.
(Emphasis Added)

Support for the amendments can be found throughout the specification, and more specifically, for example, in Figures 8, 9, 10 and 11. The magnetic metal liner as shown in the Figures extends to the substrate. This configuration allows the global write line to operate as shown in Figure 5 of the specification. More specifically, as described on page 15 of the specification, “The global word line generally also includes a magnetic liner 520. The magnet liner 520 can be formed from an alloy of magnetic elements, including Nickel, Chromium, Cobalt or Iron. The magnetic liner 510 helps to shape magnetic flux fields MF formed by a current I conducted through the global word line. The magnetic flux fields MF must be created on both sides of the global word line to allow the global word line to operate in conjunction with the previously described bit lines to set the magnetic orientations of the MRAM memory cells. The magnetic flux fields are bi-directional as determined by the direction of the current I. The intensity of the magnetic flux fields is determined by the magnitude of the current I conducted through the global word line. Without the magnetic liner 510, the magnetic flux fields MF would be less concentrated on both sides of the global word line.”

The courts have ruled that “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. “Verdegall Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Also, “The identical invention must be shown in as complete detail as is contained in the ... claim.” Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Tuttle states (col. 7, lines 34-38) “ at least all the soft magnetic material layer 54 is removed from the bottom of the trench 38 before proceeding, as remaining material can disrupt or block the interaction between the word line magnetic field and the magnetic bit 24. Tuttle clearly teaches complete removal of the soft magnetic material layer from the bottom of the trench because for the Tuttle configuration, this remaining material can disrupt or block the interaction between the word line magnetic field and the magnetic bit.

The method of formation taught by Tuttle never allows the soft magnetic material 54 to contact the bottom of the trench, as therefore, doesn’t provide for the formation of the soft magnetic material physically contacting the bottom of the trench. Figures 5A, 5B, 5C, 5D of Tuttle clearly show that the magnetic material layer 54 never physically contacts the bottom of the trench 38. As the processing steps of Figures 5A, 5B, 5C, 5D show, the layers 52, 54, 56 are all deposited before etching (as shown in Figure 5A). As a result, the processing steps of Tuttle never allow the magnetic material layer 54 to physically contact the bottom of the bottom of the trench.

Not only does Tuttle not teach the steps of Claim 16, Tuttle teaches away from the steps of the claimed invention by stating “ at least all the soft magnetic material layer 54 is removed from the bottom of the trench 38”, and by the formation steps of Figures 5A, 5B, 5C, 5D which never allow the soft magnetic material layer 54 to contact the bottom of the trench 38.

The claimed invention includes anisotropically etching the deposited magnetic metal liner material leaving the magnetic metal liner material over the first liner material on edges of the trench, so that the magnetic metal liner extends to and physically contacts the bottom of the trench. This step allows for the formation of the structure shown in Figure 5 of the specification, which allows for the formation of magnetic write fields on both sides of the structure when conducting a current.

Claim Rejections Under 35 USC 103(a)

The Examiner rejected claims 20 under 35 USC 103(a) as being unpatentable over Tuttle in view of Pan et al. (US Pat. 6,548,849).

It is respectfully noted that to substantiate a *prima facie* case of obviousness the initial burden rests with the Examiner who must fulfill three requirements. More specifically, to establish a prima facie case of obviousness, three basic criteria must be met. **First**, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. **Second**, there must be a reasonable expectation of success. **Finally**, the prior art reference (or references when combined) must teach or suggest all claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP Sec. 2143, *In re vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Paralleling the MPEP references cited above, the Federal Circuit has enunciated several guidelines in making a 35 USC 103 obviousness determination. A prima facie case of obviousness is established when and only **when the teachings from the prior art itself** would appear to have **suggested** the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 783, 26 U.S.P.Q.2d 1529, 1531 (Fed Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051 (C.C.P.A. 1976)). (Emphasis added). "The mere fact that the prior art **may** be modified in the manner suggested by the Examiner does **not** make the modification obvious unless the prior art suggested the desirability of

the modification.” (Emphasis added) In re Fritch, 23 USPQ 2d 1780, 1783-84 (Fed. Cir. 1992).

1. Neither Tuttle or Pan teach the magnetic metal liner extending to and physically contacting the bottom of the trench.
2. Nothing in Tuttle and Pan suggests the desirability of modifying them to include this feature.

For the reasons described, claim 16 is patentable over the cited prior art.

Dependent claims 17-22 are directly or indirectly dependent upon claim 16. Therefore, claims 17-22 are patentable.

New claims 21 and 22 include a first MRAM array and a second MRAM array formed below and above the shared global word line as shown in Figures 3 and 4 of the specification. The cited references only teach MRAM arrays formed below the write lines.

No new matter has been added by these amendments.

The applicants respectfully request reconsideration of the claims in view of the amendments and remarks made herein. A notice of allowance is earnestly solicited.

Respectfully submitted,
Heon Lee

By: Brian Short
Brian Short, Attorney for Applicants
Reg. No. 41,309
Date: September 1, 2004
Ph. No.: 408-888-9830

Hewlett-Packard Company
Intellectual Property Section
1501 Page Mill Rd. M/S 1197 (4U-10)
Palo Alto, CA 94304-1112